

## تأثير المبيدات الغير تقليدية ومخاليطها ضد حشرة التريس التى تصيب نباتات القطن تحت الظروف الحقلية

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### المخلص العربى

أجريت التجارب بمحطة البحوث الزراعية بالجميزة - غربية خلال موسم ٢٠١٠، ٢٠١١ م تحت الظروف الحقلية وذلك لتقييم التأثيرالابادى الفورى والتأثير المتبقى لبعض الزيوت المعدنية والطبيعية وبعض المبيدات الحيوية ومخاليطها على حشرة تريس القطن أثناء مرحلة البادرة .وأوضحت النتائج : كل المركبات المختبرة والمستخدمة فرديا أحدثت أعلى نسبة خفض فى التأثير المتبقى على التريس وكانت نسبة الانخفاض فى تعداد الافة تراوحت ما بين ٦٢.٤٣ ٪ الى ٤٣.٦٧ ٪ بينما التأثيرالابادى الفورى لكل المركبات المختبرة أحدثت نسبة انخفاض متوسطة تراوحت من ٤٩.٤٥ ٪ الى ٥٩.٦٨ ٪ على تريس القطن .

وأيضاً أوضحت النتائج المتحصل عليها أن كل من الزيت المعدنى والزيت النباتى عندما يخلط بالمركبات المختبرة يسبب مستوى عالى من الانخفاض فى تعداد الحشرات كتأثيرابادى فورى وتأثير متبقى. المخلوط كزد+ فباكوميك أحدثت أعلى نسبة انخفاض فى التأثيرالابادى الفورى والتأثير المتبقى حيث أعطى ٧٣.٤٩ ٪ و ٧٤.٠٢ ٪على الترتيب. بينما المخلوط ناتيرلو+ فباكوميك أحدثت أعلى نسبة انخفاض فى التأثيرالابادى الفورى والتأثير المتبقى حيث أعطى ٨٢.٦٧ ٪ و ٨٠.٦٣ ٪ على الترتيب .

وعموماً يمكن القول أن كل المخاليط المستخدمة أعطت تأثير منشط والذى تسبب فى انخفاض فى تعداد التريس اثناء مرحلة البادرة للقطن.

## EFFECT OF NON-CONVENTIONAL INSECTICIDES, MINERAL OILS, BIO-AGENTS AND THEIR MIXTURES AGAINST COTTON THRIPS *Thrips tabaci* (LIND.) UNDER FIELD CONDITION

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**ABSTRACT:** The experiments were carried out at Gemmeiza Agricultural Research Station Gharbia Governorate during 2010, 2011 under field conditions to evaluate the initial and residual effect of some mineral oils and bioinsecticides and their mixtures against cotton thrips, *Thrips tabaci* (Lind) during seedling period. All tested compounds were induced the highest reduction where the percentage in insect ranged between 43.62 to 67.43% and the initial effect of all tested compounds induced a moderate reduction giving 45.49 to 68.59% . The mineral oil (KZ) and Natrilo when combined with all the tested compounds induced high level of reductions as initial and residual effect. (KZ + Vabcomic) induced the highest initial and residual reduction values giving 73.49 and 74.02% respectively, while (Natrilo + Vabcomic) induced the highest initial and residual reduction giving 82.67 and 80.63 % against cotton thrips, respectively. Generally, it could be concluded that all mixtures had a high potency effects against thrips population (*T. tabaci*.) especially during seedling stage.

**Key words:** Thrips, mineral oil, *Thrips tabaci* , cotton.

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### INTRODUCTION

Cotton (*Gossypium barbadense* L.) is considered the most important crop in the agricultural economy of Egypt. Cotton plants are liable to be attacked by several pests all over their life spans , i.e., during seedling period ,growing and flowering stages. In recent years cotton pests such as cotton aphids , Jassids, whitefly, thrips and spider mites, cause severe damage to cotton plants (Holling, 1961 ; El Nawawy *et al.*, 1980 : Salams *et al.*, 1984 and Dent , 1991 ). They suck the sap of plant tissues, green leaves and young bolls and their saliva cause chemical disorders in plant tissues beside transmitting certain microbial diseases (Costa and Brown 1991). Cotton thrips, *Thrips tabaci* (Lind) is a polyphagous species attacking more than 200 plant species of field, vegetables , ornamentals and orchard crops ( Best, 1968 ). Although primary damage to plants is physical (causing silver necroses ), *Thrips tabaci* is also known to be a vector of several plant pathogens and thus causes substantial economic damage (Reddy, *et al.*, 1983 and North and Shelton, 1986).

The conventional or non-conventional insecticides were used against *T.tabaci*

exhibited a high efficiency in controlling the insect pest Mousa and Taha (2001); Abdel-Aziz(2002) and Khattab *et al.*, (2006).Also, the application with macro elements as potassium or micro elements as Zinc, Iron, Manganese or Born in the recommended concentrations gave a good results in reducing the population of the piercing-sucking insect pests as aphids, leafhoppers and thrips (Metwally and Gabr 1997; Goncalves *et al.*, 2004 and El- Shiriff 2009).

The main objective of this study is to test different compounds (Vabcomic ,CM006 , Evisect , Biofly and Mpade) either alone or combined with mineral oil (KZ and Natrilo) against *Thrips tabaci* infesting cotton on seedling stage .

### MATERIALS AND METHODS

Field experiments were conducted according to Ministry of Agriculture protocol (1993) at Gemmeiza Agricultural Research Station Gharbia Governorate during 2010 and 2011 season to evaluate the efficiency of non- conventional insecticides (Minerals oil, and Bio-insecticides) and their Mixtures against cotton thrips, *Thrips tabaci* (Lind) during cotton –seedlings stage All tested

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compound were sprayed at their recommended rate mentioned before using knapsack sprayer, 10 litre capacity (200 litre spray solution / fed.) on cotton plants infested with thrips . An area was divided to 32 blocks to test the seven compounds beside the control once, Seven treatments were distributed in complete randomized block design replicated four times . Infestation was assessed before spraying and after 1, 4, 7, 10 and 13 days of spraying on 100 cotton seedlings from each treatment and the untreated one then inspected using lens in the field early morning to determine the number of the thrips stages (nymphs and adults) . Percentages of reduction for the infestation of the target pest was estimated according to Henderson and Telton (1955) equation as follows :

$$\text{Reduction \%} = [1 - (a / b) \times (c / d)] \times 100$$

**Whereas:**

- A = No. of individuals in treatment after spraying
- b = No. of individuals in treatment before spraying
- c = No. of individuals in (control) before spraying
- d = No. of individuals in (control) after spraying

Statistical analysis was mad to show

The chemical compounds were tested in the formulated form the of recommended rate except the biopesticide ( biofly) which was calculated on the basis of number of conidial / ml.

**The tested compounds were showed in Table (1):**

- 1-Oils
  - (a)-KZ. oil (95% E.C.) formulated mineral oil supplied by Kafer El-Zayat pesticides and chemicals Company.
  - (b)-Natrilo (97% blend of vegetable oil, emulsifies and antioxidant)
- 2- Bio insecticides:
  - a- Biofly SC 50% = *Beauvaria bassiana* as a liquid microbial pesticide containing  $3 \times 10^7$  conidia / ml.
  - b- CM006 1 % (Milbemectin) natural produced by soil microorganism. *Streptomyces hygroscopicus*
  - c –Vabcomic (Abamectin) 1.8% EC natural produced by soil microorganism *Streptomyce avermitits*
- 3- Chemical compounds :
  - a -Evisect 50% wp N, N- dimethyl 1,2,3, trithiane- 5- yl-amine hydrogenoxalate
  - b - M-pade 49% potassium salts of fatty acid

**Table (1) : Tested compounds and mixtures in the field application recommended rates on cotton thrips, *Thrips tabaci***

Compounds		Mixtures			
Name	rate of application/fed.	Name	rate of application /fed.	Name	rate of application /fed.
KZ Oil	3.5 litre	KZ oil + Natrilo	3.5 litre + 2 litre	Natrilo+ KZ Oil	2 litre +3.5 litre
Natrilo	2 litre	KZ Oil+ Vabcomic	3.5 litre +80 m3	Natrilo+ Vabcomic	2 litre + 80 cm3
Vabcomic	80 cm3	KZ Oil+ CM006	3.5 litre +150 cm3	Natrilo+ CM006	2 litre+150 cm3
CM006	150 cm3	KZ Oil+ M-pade	3.5 litre +1.5litre	Natrilo+ M-pade	2 litre +1.5 litre
M-pade	1.5litre	KZ Oil+ Biofly	3.5 litre +300 cm3	Natrilo+ Biofly	2litre+ 300 cm3
Biofly	300 cm3	KZ Oil+ Evisect	3.5 litre +500 cm3	Natrilo+ Evisect	2 litre+500 cm3
Evisect	500 cm3				

## **RESULTS AND DISCUSSION**

Initial and residual activity of the tested compounds and their mixtures with oils (KZ and Natrilo) against *Thrips tabaci* infesting cotton seedling stage under field conditions were studied.

### **1-The initial and residual effect by individually compounds :**

The Ministry of Agriculture recommended to use the natural products and safe materials in controlling pests, effectively should believing initial effect not less than 70% reduction and residual effect not less than 40%, (Mousa and El-Sisi 2001).

The residual effect was calculated as a mean of total effect after 4, 7, 10 and 13 days from spraying. Results indicated that most tested compound individually gave high residual effect agree with the Ministry of Agriculture recommendations except in case of initial effect while showed low initial effect less than that of recommendations. The obtained data in Table (2) indicated that, the initial and residual reduction (one day after treatment and mean of total effect) were the highest percentage caused by CM006 (68.59% and 66.73%) followed by Vabcomic (65.01% - 66.76%). While, the M-pade exhibited the lowest initial and residual reduction (45.49% - 43.62%).

### **2-The initial and residual effect of combined compounds:**

Data presented in Table (3,4) indicated that, all the tested compounds showed a pronounced reductions in the numbers of the cotton thrips after application, and the tested compounds mixtures of mineral oil and Natrilo gave high initial and residual effects which agree with the Ministry of Agriculture recommendations expect in case of KZ + biofly and KZ + M-pade which showed high residual effect and low initial effect less than that of recommendations. Data in Table (4) revealed that Natrilo when mixed with all the tested compound induced high initial and residual effect agree with the Ministry of Agriculture recommendations while (KZ + Natrilo) which showed high residual effect and low initial effect less than that of recommendations. It is clearly that

the KZ and Natrilo compound increased the residual mortality when added to all tested compound of (KZ oil +Vabcomic), (KZ oil + CM006), (KZ oil + M-pade), (KZ oil +Biofly) and (KZ oil + Evisect) which caused 74.02, 71.40, 60.01, 58.60 and 72.32 % reduction respectively for mixing with KZ oil, while Natrilo added to all tested compounds(Natrilo +Vabcomic), (Natrilo + CM006), (Natrilo + M-pade), (Natrilo +Biofly) and (Natrilo + Evisect) gave 80.63, 80.70, 72.79, 65.89 and 79.01 % reduction respectively against *Thrips tabaci* infesting cotton seedling stage as residual effect.

Also data presented in Tables (3,4) revealed excellent results due to the use of mixture consisting of Natrilo and different tested compounds compared with using the compounds individually against cotton thrips. These results were also observed in the initial and residual effect against cotton thrips, as it gave the highest initial and residual effect for KZ + Vabcomic giving 73.49 and 74.40% respectively, while Natrilo + Vabcomic giving 82.68 and 80.63 against cotton Thrips respectively. These results are in agreement with those of Mousa and El-Sisi (2001), Abd El-Aziz (2002), Abdel-Wahab *et al*, (2001) and Al-Fawaeer and Abu-Abeid (2002). Mousa (2003), El-Hamid and Ghatwary (2006), Khattab *et al.*, (2006), Al-Mazraawi (2007), Awadalla *et al.*, (2011) and Abd-Allah, (2011).

The general means of the reduction percentages revealed that vabcomic + Natrilo was the most toxic compound against cotton thrips, the mean values were 82.67 for initial effect and 80.63 for residual effect followed by CM006 + Natrilo with 77.79 and 80.70% respectively, while KZ + Vabcomic induced a the highest initial and residual reduction giving 73.49 and 74.02% respectively.

Results in Table (3,4) indicated generally that mineral oil (KZ) and Natrilo when combined with all the tested compounds reduced the mean numbers of cotton thrips *Thrips tabaci* (Lind) during seedling stage and induced high level of reduction of insect population as initial and residual effect.

TABLE 2

TABLE 3

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TABLE 4

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The general means of the reduction percentages revealed that vabcomic + Natrilo was the most toxic compound against cotton thrips, the mean values were 82.67% for initial effect and 80.63 for residual effect followed by Natrilo + CM006 with 77.79 and 80.70% respectively, while KZ + Vabcomic induced the highest initial and residual reduction giving 73.49 and 74.02% respectively.

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Generally effect of the tested compounds when mixed with the mineral oil (KZ) and Natrilo exceeded pronouncedly that induced when used singly against *T. tabaci* infesting cotton seedling stage.

## REFERENCES

Abd-Allah, A.A.A. (2011). Influence of some adjutants on efficacy of certain insecticides against onion thrips, *thrips tabaci* (Lind). Infesting onion and garlic plants. J. Plant Prot. and Path., Mansoura Univ., 2 (2): 169-178.

- Abd-El-Aziz, S.E. (2002). laboratory and field Evaluation of some biorational insecticides against onion *thrips tabaci* (Lind). (Thysanoptera:thripidae ) on garlic plant . Bull.Ent. Soo. Egypt Econ, 28: 123-126 .
- Abdel-Wahab, H., A.M. Taha, A.M. Zaaky and M.S. Hassen (2001). Effect of controlling *thrips tabaci* (Lind). And weed onion and garlic fields, on neighboring cotton field. J. Agric. Sci. Mansoura Univ., 26 (6) 3989-3997
- A-Fawaeer and Abu-Abeid (2002). Intergrated pest management of onion thrips *thrips tabaci* (Lind). (Thysanoptera: thripidae ) under protective conditions. 2<sup>nd</sup> int .Conf. Plant Protect. Res. Cairo Egypt, 21-24 December.
- Al- Mazraawi, E.M. (2007). Effect of fungi *Beauveria bassiana* on onion *thrips tabaci* lindman ( Sysonoptrea: Thripidae) Egyptian J. Biolo. Pest Control 14(1) 50-55.
- Awadalla, S. S., M.E. El-Naggar, A. M. Taha and Omnia F. Hamid (2011). Influence of conventional and non- conventional insecticides as well as the macro- and micro elements on population density of the onion thrips, *thrips tabaci* (Lind). J. Plant Prot. and Path., Mansoura Univ., 2 (2): 131-139.
- Best, R. J. (1968). Tomato spotted wilt virus. (*Adv. Virus. Res.*, 13: 65-145). Cheo, J. J.; R. F. I. Man, D. Gonsavres and W. C. Mitchell (1986): Reservoir weed hosts of tomato spotted wilt virus. plant Disease. 70: 1014 - 1017.
- Costa, H.S. and J.R. Brown (1991). Variation in biological characteristics and esterase pattern among population of *Bemisia tabci* and the association of one population with silver symptom induction. Entomology Experimentalisy applicant, p p 211-219.
- Dent, D. (1991). Insect pest management. C. A. B. International, pp. 295.
- El- Hamid, AQ. and F. M. A. El-Ghatwary (2006). Persistence and biology activity of mint and garlic oil against the cowpea aphid. Egypt J. Biol. Control 18(2): 30-34.
- El- Nawawy, A. S., M. A. Ashri and A. Salama (1980). The effect of different pyrethroids, several O.P. compounds and



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- certain mixtures on the sucking pests M' cotton fields in Kafr El-sheikh Governorate (A. R. Egypt). Med. Fac. Landbouww. Rijksum\* v. Gent, 34(3): 659-665.
- El-Shirif, S. A. N., A.H. Mohamady, N.S. AbdEl-Hai and Z. M. El-Attal (2009). Odifiers for optimum pesticidal activity of the fatty acid-based and azadriachtin compounds. *Annals of Agric., Sci.*54: 1, 211-216.
- Goncalves, P.A., E. Sousa and C. R. Silva (2004). Mineral and organic fertilization and onion thrips *thrips tabaci* (Lind). (Thysanoptera:thripidae) population density . *Ciencia – Rural*, 34 (4) : 1255-1257.
- Henderson, C.F. and E. W. Telton (19550). Test with acaricides against the brown wheat mite . *J. Econ. Entomol.*, 48 : 157-161.
- Holling, C.S. (1961). Principle of insect predation. *Ann.Rev.Ent.* 6: 163-182.
- Khattab, M. K., Y.R. Manoon, S. A. S. Hussain and I. Tahir (2006). Cooperative effect of neem (Azadirachindica) oil an water extract am Baythroid Tm against white fly , jassids and thrips on cotton . *Pakistan. Entomol.*28 (1):31-37.
- Metwally, S.A. G. and A.M. Gabar (1997). The effect of macro-and micro elements on the population of Aphids and whiteflies. *Fayoum. Agric, Res. & Dev.* 11(2): 306-307.
- Mousa, G.A., and A. G. El-Sisi (2001). Testing of some local alternatives mineral oils, plant materials and surfactants against piercing and sucking pests infesting squash crop. First conference Safe Alternatives Of Pesticides For Pest Management.ASSIUT Univ., Egypt, 28-29<sup>th</sup>,83-98.
- Mousa, G.A. and A.M. Taha (2001). Efficiency of the three oils against *Aphid fabae* and *Teraanyhus Urtiticae* . *Egyptian J. Agric., Res.* 80:3, 1133-1140.
- Ministry of Agriculture 1993.Protocol of Evaluation of the efficiency of pesticides in Egyptian culture Pp.85 .
- North, R.C. and A. M. Shelton (1986): Over wintering of the onion thrips. *Thrips tabaci* (Lind). (Thysanoptera:thripidae ) in New York ( *Environ. Enttomol.* 15 : 695-699).
- Reddy, D.V.R., P.W. Amin, D. Medonald and A.M. Ghaneker (1983). Epidemiology and control of groundnut bud necrosis and other diseases of legume crops in India caused by tomato spotted wilt virus. Pp. 93-102. (Blackwell Oxford, England, 377 pp.).
- Salama, A.E., F.A. Adam, A. El-Nawawy, M. Abbassy and M. Abo- Salem(1984). Sequential insecticide treatments for the control of sucking pests with regards to some of their predators. *Med. Fac. Landbouw. Rinkswily. Gent.*, 49: 885-891.

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### المخلص العربى

أجريت التجارب بمحطة البحوث الزراعية بالجميزة - غربية خلال موسم ٢٠١٠، ٢٠١١ م تحت الظروف الحقلية وذلك لتقييم التأثيرالابادى الفورى والتأثير المتبقى لبعض الزيوت المعدنية والطبيعية وبعض المبيدات الحيوية ومخاليطها على حشرة تريس القطن أثناء مرحلة البادرة .وأوضحت النتائج : كل المركبات المختبرة والمستخدمة فرديا أحدثت أعلى نسبة خفض فى التأثير المتبقى على التريس وكانت نسبة الانخفاض فى تعداد الافة تراوحت ما بين ٦٢.٤٣ ٪ الى ٤٣.٦٧ ٪ بينما التأثيرالابادى الفورى لكل المركبات المختبرة أحدثت نسبة انخفاض متوسطة تراوحت من ٤٩.٤٥ ٪ الى ٥٩.٦٨ ٪ على تريس القطن .

وأيضاً أوضحت النتائج المتحصل عليها أن كل من الزيت المعدنى والزيت النباتى عندما يخلط بالمركبات المختبرة يسبب مستوى عالى من الانخفاض فى تعداد الحشرات كتأثيرابادى فورى وتأثير متبقى. المخلوط كزد+ فباكوميك أحدثت أعلى نسبة انخفاض فى التأثيرالابادى الفورى والتأثير المتبقى حيث أعطى ٧٣.٤٩ ٪ و ٧٤.٠٢ ٪على الترتيب. بينما المخلوط ناتيرلو+ فباكوميك أحدثت أعلى نسبة انخفاض فى التأثيرالابادى الفورى والتأثير المتبقى حيث أعطى ٨٢.٦٧ ٪ و ٨٠.٦٣ ٪ على الترتيب .

وعموماً يمكن القول أن كل المخاليط المستخدمة أعطت تأثير منشط والذى تسبب فى انخفاض فى تعداد التريس اثناء مرحلة البادرة للقطن.





**Table (2): Reduction percentages of the tested compounds at recommended rate on *Thrips tabaci* populations on cotton seedlings during 2010 -2011 seasons .**

Treatment	Mean no. of Thrips per 100 seedlings											Mean R%
	Before spray	Initial effect after 1 day		Days after spray ( Residual effect)								
				4day		7 day		10 day		13 day		
		No.	R%	No.	R%	No.	R%	No.	R%	No.	R%	
Kz Oil	1585	630 <sup>ab</sup>	64.36	590 <sup>a</sup>	73.30	650 <sup>a</sup>	72.27	750 <sup>a</sup>	66.05	845 <sup>a</sup>	58.11	67.43
Natrilo	1640	940 <sup>ch</sup>	48.60	980 <sup>b</sup>	57.13	1025 <sup>b</sup>	57.74	1110 <sup>b</sup>	51.44	1210 <sup>bc</sup>	42.03	52.09
Vabcomic	1640	640 <sup>ac</sup>	65.01	596 <sup>a</sup>	73.93	675 <sup>a</sup>	72.17	800 <sup>a</sup>	65.01	920 <sup>ab</sup>	55.92	66.76
CM006	1610	564 <sup>a</sup>	68.59	610 <sup>a</sup>	72.82	690 <sup>a</sup>	71.02	768 <sup>a</sup>	65.78	875 <sup>a</sup>	57.30	66.73
M-pade	1530	930 <sup>cf</sup>	45.49	1045 <sup>bf</sup>	51.01	1150 <sup>fb</sup>	49.17	1230 <sup>c</sup>	42.33	1325 <sup>cf</sup>	31.96	43.62
Biofly	1720	860 <sup>bd</sup>	55.16	1010 <sup>bc</sup>	57.87	1145 <sup>db</sup>	54.98	1250 <sup>cf</sup>	47.86	1340 <sup>cg</sup>	38.79	49.88
Evisect	1530	590 <sup>a</sup>	65.42	620 <sup>a</sup>	70.93	640 <sup>a</sup>	71.71	745 <sup>a</sup>	65.07	840 <sup>a</sup>	56.86	66.14
Untreated area	1650	1840	--	2300 <sup>dh</sup>		2440 <sup>hf</sup>		2300 <sup>fh</sup>		2100 <sup>fi</sup>		--
L.S.D	--	40.55		51.86		65.74		81.55		59.63		

Mean followed by the same letter in each column are not significantly at 5% level

**Table (3): Reduction percentages of the tested compounds at recommended rate on *Thrips* populations on cotton seedlings during 2010 -2011 seasons .**

Treatment	Mean no. of Thrips per 100 seedlings											Mean R%
	Before spray	Initial effect after 1 day		Days after spray( Residual effect)								
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		No.	R%	No.	R%	No.	R%	No.	R%	No.	R%	
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Kz Oil +Vabcomic	1910	550 <sup>bc</sup>	73.49	470 <sup>ab</sup>	78.73	514 <sup>b</sup>	77.67	614 <sup>b</sup>	71.95	650 <sup>b</sup>	67.71	74.02
Kz Oil +CM006	1870	610 <sup>cd</sup>	69.98	530 <sup>bc</sup>	75.50	570 <sup>cd</sup>	74.71	640 <sup>bc</sup>	70.13	685 <sup>bc</sup>	65.25	71.40
Kz Oil + M-pade	1900	765 <sup>gf</sup>	62.94	805 <sup>fg</sup>	63.37	815 <sup>fh</sup>	64.41	905 <sup>dh</sup>	58.43	925 <sup>dh</sup>	53.81	60.01
Kz Oil + Biofly	1740	690 <sup>fe</sup>	63.50	715 <sup>df</sup>	64.48	790 <sup>fg</sup>	62.33	875 <sup>dg</sup>	56.12	890 <sup>dg</sup>	51.47	58.60
Kz Oil + Evisect	1580	500 <sup>a</sup>	70.87	430 <sup>a</sup>	76.47	450 <sup>a</sup>	76.37	520 <sup>a</sup>	71.28	580 <sup>a</sup>	65.17	72.32
Untreated area	1850	2010 <sup>hg</sup>		2140 <sup>gh</sup>		2230 <sup>gi</sup>		2230 <sup>fi</sup>		2100 <sup>fi</sup>		--
L.S.D	--	27.64		23.32		29.37		40.26		35.13		

Mean followed by the same letter in each column are not significantly at 5% level

**Table (4): Reduction percentages of the tested compounds at recommended rate on *Thrips tabaci* populations on cotton seedling during 2010 -2011 seasons .**

Treatment	Mean no. of Thrips per 100 seedlings											Mean R%
	Before spray	Initial effect after 1 day		Days after spray( Residual effect)								
				4 day		7 day		10 day		13 day		
		No.	R%	No	R%	No.	R%	No	R%	No	R %	
Natrilo	1640	940 <sup>gi</sup>	48.60	980 <sup>fh</sup>	57.13	025 <sup>hi</sup>	57.74	1110 <sup>gh</sup>	51.44	1210 <sup>fg</sup>	42.03	52.09
Natrilo + Kz Oil	1850	590 <sup>cf</sup>	62.66	465 <sup>b</sup>	79.35	390 <sup>a</sup>	83.38	450 <sup>a</sup>	79.87	560 <sup>a</sup>	72.97	78.88
Natrilo+ Vabcomic	1830	370 <sup>a</sup>	82.67	375 <sup>a</sup>	84.78	325 <sup>c</sup>	85.99	447 <sup>a</sup>	79.79	575 <sup>a</sup>	71.94	80.63
Natrilo + CM006	1910	495 <sup>bc</sup>	77.79	370 <sup>a</sup>	83.90	340 <sup>a</sup>	85.96	640 <sup>bc</sup>	80.07	585 <sup>a</sup>	72.88	80.70
Natrilo + M-pade	1845	575 <sup>cd</sup>	73.29	480 <sup>bc</sup>	78.38	520 <sup>d</sup>	77.78	625 <sup>b</sup>	71.96	940 <sup>c</sup>	63.02	72.79
Natrilo + Biofly	1905	650 <sup>dh</sup>	70.75	640 <sup>df</sup>	72.08	705 <sup>f</sup>	70.82	812 <sup>cd</sup>	64.72	964 <sup>cd</sup>	55.93	65.89
Natrilo + Evisect	1775	485 <sup>b</sup>	76.68	395 <sup>a</sup>	81.50	365 <sup>b</sup>	83.78	425 <sup>a</sup>	80.18	764 <sup>b</sup>	70.57	79.01
Untreated area	1920	2240 <sup>hk</sup>		2310 <sup>gi</sup>		2435 <sup>ij</sup>		2320 <sup>hi</sup>		2150 <sup>hi</sup>		
L.S.D	--	23.62		27.37		24.03		26.78		36.06		

Mean followed by the same letter in each column are not significantly at 5% level